

Fire Protection Facts

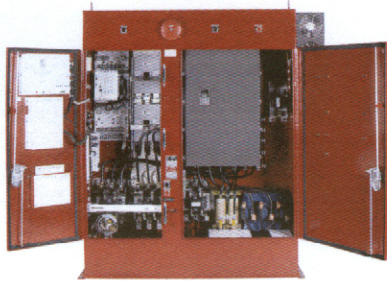


DIVERSIFIED MARKETING SPECIALISTS, LLC

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Dispelling the myths of the VFD Fire Pump Controller



Master Controls 250 HP Variable Frequency Drive Controller
With full voltage bypass controller

This information is presented to dispel any negative information you may have acquired from other manufacturers regarding application and performance of the Variable Frequency Drive fire pump controller.

Myth #1: A 200 HP VFD is the size of a refrigerator.

Fact: Some drives are, but not all, as shown in above photo is a 250 HP, VFD controller with an ATL bypass controller.

Myth #2: There is no other benefit other than the elimination of PRV's.

Fact: Starting current drawn from a VFD is 115 to 150% max (Master Controller is set at 125%) depending on acceleration time. Typically, a smaller Gen-Set can be selected.

Fact: Since VFD's start at low frequencies, the motor always reaches it's rated torque and speed without concern of transitioning into locked rotor current as commonly seen with wye delta.

Fact: Single point of failure list PRV's as most likely.

Fact: NFPA-14-2007 requires PRV's to have isolation and piggy back PRV's to manage and control a wider range of flow. Eliminating these will equal the added cost of a VFD. *The bonus is;* No high maintenance package w/ yearly testing costs and inconveniences to tenants.

Fact: If you use a VFD fire pump controller you can add pump pressure for future expansion.

Fact: Pump discharge pressure, regardless of city fluctuation will NEVER exceed system design pressure throughout the curve, including shutoff.

Myth #3: Only the factory can service units in the field.

Fact: Numerous Master agents have started these units which up to the present, have had no reason for servicing. Other units

have been started by factory personnel.

Myth #4: Swing choke isolates THE VFD from the incoming power supply.

Fact: Swing choke is merely a filtering device and not a power isolator. The safest and best mode of taking a drive offline and out of the normal power path until needed for operation is through "air gap" isolation. This is achieved using two separate contactors installed ahead of the VFD with 1" air gaps to provide full isolation and protection from line voltages, spikes, transients and surges.

Myth #5: The VFD is significantly too large for equipment rooms.

Fact: Master Controls has the smallest most compact cabinets in the industry. The 125 HP 3 bay cabinet with Primary Reactor backup controller and transfer switch measures 75" X 94" X 28.75" as shown below.



ECVRT-125-46

Special points of interest:

- DISTINCT SAVINGS CAN BE REALIZED USING THE VARIABLE FREQUENCY DRIVE FIRE PUMP CONTROLLER.
- TYPICALLY USING THE VFD YOU CAN REDUCE GEN-SET SIZING
- VFD LOW FREQUENCIES ALWAYS ALLOW MOTOR TO REACH FULL RATED TORQUE
- NOT ALL MANUFACTURERS BUILD TO CURRENT NFPA-20 STANDARDS

Inside this issue:

- DISPELLING MYTHS OF THE VFD FIRE PUMP CONTROLLER **1,3**
- RELIABLE POWER DEFINED **2**
- PHOTOS OF VFD INSTALLED APPLICATIONS CURRENTLY IN SERVICE **3,4**
- ENDORSEMENT BY P.E. FROM PROMINENT FIRM **4**

Reliability of Fire Pump Power Supplies

The Need for Backup Emergency Power

What is Reliable Power?

It has become apparent that some Fire Officials are not in concert with previous requirements in their assessment of "Reliable Power". Specifically, some officials are approving installation of fire pumps in buildings without requiring back-up (emergency) power for the pump.

If a building is in a "Life Safety" situation, to what advantage is there to determine the local power supply a reliable source? It is also apparent that the power supply in almost every city in the United States experiences power outages in excess of four hours **per year** which does not meet the criteria for "reliable power" as specified in NFPA-20. Moreover, in an emergency situation, continued operation of the fire pump to provide a constant supply of fire water for the automatic sprinklers is essential in modern buildings. They are an integral and essential part of the life safety requirements. Other emergency services such as alarms, elevators, smoke handling fans and emergency lighting; to name a few; neither replace the need for reliable operation of automatic sprinklers any more than the sprinklers replace or diminish the need for any of the other required services.

Ten years ago, there was not a single electric fire pump installation without an automatic transfer switch for back-up emergency power. Why then, do we seem to be re-

verting back to more installations *without* back-up power for the pump? Must we experience a disastrous situation to rectify this ostensible inadequacy?

Since the engineer of record is responsible for the design and code compliance he/she assumes total liability for problems or any loss if a fire should occur during a power outage or vice versa. For this reason it is best practice to include an emergency backup power source for the fire pump in the design of the system.

If a Fire Marshal deems the supply *reliable power* after the design is established, it would be in the engineer's best interest to obtain a signed release from the AHJ who determines the fire pump power supply is "Reliable Power" and does not require a transfer switch backup to a second source.

Of course, and is so often the case, everything is always okay until there is a problem!

It's important to note that NFPA-20 has primary responsibility for fire pump power supplies. This standard requires that the fire pump be supplied with a source of "reliable power". If this is not practical or possible, that the fire pump be supplied with two or more sources of power.

This portion was co-authored by James Nasby, Head Engineer at Master Control Systems in Lake Bluff Illinois.

Jim Nasby holds a B.S.E.E degree from the Illinois Institute of Technology (I.I.T.).

He's a full member of, The Institute of Electrical and Electronic Engineers, the Society of Fire Protection Engineers and the National Fire Protection Association.

He has been responsible for fire pump controller design since 1972 and holds several patents. He has served on Committees for:

NFPA 20 (Fire Pumps)

NFPA 110 (Emergency Power Supplies)

NFPA 70, the *National Electrical Code* on Code Making Panel #13

He is a member of Underwriters Laboratories Standards Technical Panels for: UL 218 Standard for Fire Pump Controllers and UL 1004A on Fire Pump Motors.

Jim is also contributing author of several chapters on fire pump power supplies, fire pump motors and controllers for the NFPA text book:

Pumps for Fire Protection Systems and co-author of the chapter on Power Supplies and Controllers for Motor Driven Fire Pumps. *NFPA Fire Protection Handbook* 19th and 20th Editions..

He is the Director of Engineering for Master Controls. in Lake Bluff, Illinois.



"RELIABLE POWER" PER NFPA-20 IS DEEMED A POWER SUPPLY THAT IS ON AND AVAILABLE WITH NO MORE THAN FOUR TOTAL HOURS OF OUTAGE PER YEAR!

Dispelling Myths Continued...

Continued from page 1...

Myth #6: VFD controllers are extremely expensive and have very poor payback.

Fact: Depending on the circumstances of the design, in many cases, the added cost of the VFD can generate a *net savings* upon installation.

Example: Design of high end condominium in Tampa, FL, required three pumps, one of which was located on the 16th floor. The elimination of PRV's plus Gen-Set reduction and elimination of concrete encased wiring to the 16th floor, **saved** the owner \$250,000 at the onset of the project. Further, a savings has been realized on each and every one of the 31 Master units currently in service.

Myth #7: The VFD requires very high maintenance.

Fact: Among the numerous installations around the country, over the past four years, Master Controls has variable frequency drive controllers installed from 2,000, up to and exceeding 9,400 actual **running hours** in trouble free applications and requiring no more maintenance than any other standard installed fire pump controller.

Myth #8: VFD's are highly susceptible to lightning hits. A lightning strike will render the drive inoperable.

While nothing will survive a direct lightning strike, good design minimizes the impact of induced surges and transients.

Fact: A large distribution warehouse, with a Master VFD fire pump controller was

recently struck by lightning. The entire building alarm system was severely damaged and required a total rebuild with many new components, while the isolated VFD in the Master Controller sustained no damage at all and is currently operational.

The Master Controller, with "air gap" isolation as a standard feature, totally protected the drive from the intense power surge.

Myth #9: The VFD Technology is too new.

Fact: VFD Process and Domestic pumps have been common for over 15 years. Master announced and installed their first system in early 2003.

Myth #10: The technology is too delicate and sensitive for a pump room environment.

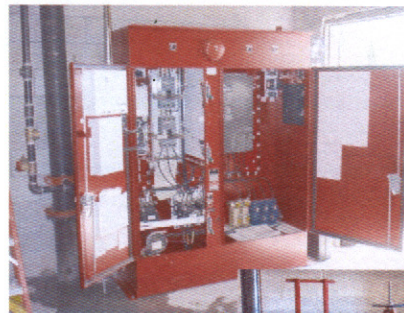
Fact: When constructed to the 2007 Standards, these units are more reliable than standard controllers because they have two separate power paths. With over 30 Master units installed since 2003 having an accumulated running time in excess of 12,000 hours, all units have proven to be trouble free.

Myth #11: Special Plumbing Sensing is required for installation.

Fact: Master requires only the sensing installed on their controller.

Myth #12: Capacitors must be constantly used or they will fail.

Fact: Drives (VFD's) that use high quality capacitors have



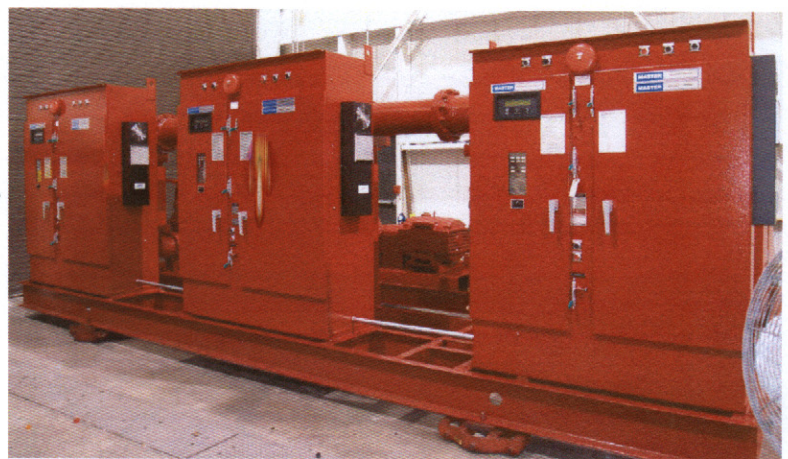
Installed and running in Florida, trouble free, since Sept 2005.
Master ECV 100HP 460V



a shelf life of many years. Technically, this means there is no need to keep a drive running to prevent capacitors from being reformed unless they are a particularly poor quality. If the unit operates once or twice a year, that is sufficient. In addition, by keeping the drive off line until needed will greatly extend the life of capacitors as well as the life of the fans and other components in the Variable Frequency Drive fire pump controller.

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This photo is actually a Large four pump system, with Variable Frequency Drive Fire Pump Controllers and Primary Reactor Bypass





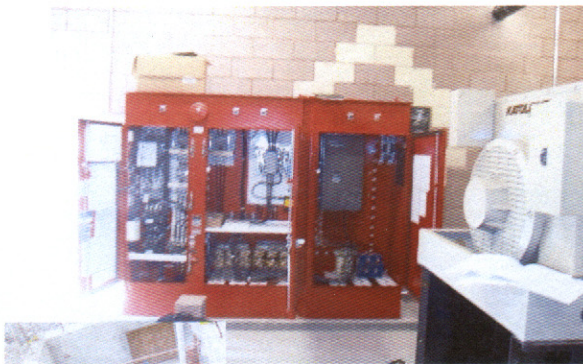
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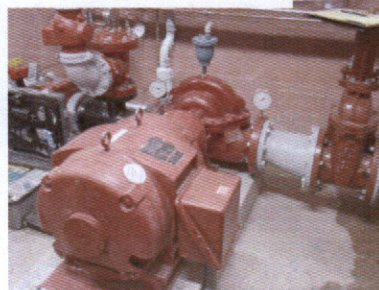
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Master Variable Frequency Drive Fire Pump Application
Installed and Running in Phoenix since 2005



Vertical Turbine located in vault outside the building



Master VFD Endorsed by Engineer with Prominent Firm

The above photos are of the Fire Pump and VFD Controller in Warren, PA. The Controller is located in the The Generator Building. This system runs 24/7 every other week. It has clocked over 9,000 running hours. It supplies both fire water and process water for a commercial and residential complex.

I interviewed James Peterkin P.E. of HLM-Heery in Philadelphia, PA. Since he has designed projects using the Master VFD, I asked what he thought of the product. His response was as quoted; "I have designed projects using the Master VFD, among them is the Orlando Federal Courthouse in Orlando, Florida. I

followed every aspect of this project including onsite inspections and startup of the fire pump. This controller is the best application I have ever seen with the smoothest startup and easiest testing. I highly recommend it's use in every project where this controller can be applied. There are numerous types of applications that will benefit from installing the VFD. Campus systems with long runs of pipe, high rise buildings and locations with fluctuating

suction pressures to name a few."

Mr Peterkin is a professional engineer who was affiliated with FM for many years as a testing agent for fire protection systems insured by FM. His innate understanding and experience in the fire protection industry for over 20 years qualifies him as an expert in his field. He was a recent speaker at the ASPE Symposium in Atlanta, Georgia, November 3rd, speaking on NFPA-14 Standpipes and NFPA-20 Pumps. Within his presentation he addressed the Variable Frequency Drive Fire Pump Controllers.



Shown at left is a photo taken by Jim Peterkin at the field acceptance test for the Orlando Federal Courthouse in Orlando, Florida.